

WE CLAIM:

1. A gravity-flow liquid treatment system, comprising:
a first liquid container; and
a filter device in communication with the first liquid container and capable of providing a user with a visual indication of device exposure to at least one contaminant.
2. The system of Claim 1 wherein a sufficient liquid flow rate through the filter device is achieved with a liquid head pressure of less than about 1.0 psi.
3. The system of Claim 1 wherein a sufficient liquid flow rate through the filter device is achieved with a liquid head pressure of less than about 0.5 psi.
4. The system of Claim 1 further comprising a second liquid container configured to receive liquid from the first liquid container after the liquid has passed through the filter device.
5. The system of Claim 4 wherein the first liquid container and the second liquid container are disposed in a pitcher.
6. The system of Claim 1 wherein the gravity-flow liquid treatment system is a water dispenser.
7. The system of Claim 6 wherein the water dispenser is suitable for inclusion in a refrigerator.
8. The system of Claim 6 wherein the water dispenser is a water cooler.
9. The system of Claim 1 wherein the gravity-flow liquid treatment system is a portable drinking device.
10. The system of Claim 9 wherein the portable drinking device is a drinking bottle.
11. The system of Claim 1 wherein the gravity-flow liquid treatment system is integrated into a beverage-making apparatus.
12. A gravity-flow liquid treatment system, comprising:
a first liquid container;
a filter device in communication with the first liquid container; and

a first contaminant indicator element within the first liquid container, the element containing at least one agent capable of undergoing a color-change reaction in response to at least one contaminant.

13. The system of Claim 12 wherein the first contaminant indicator element is attached to a wall of the first liquid container in a position in which the contaminant indicator element can come into contact with source liquid.

14. The system of Claim 12 wherein the first contaminant indicator element is attached to the filter device.

15. The system of Claim 12 wherein the first contaminant indicator element is able to move freely throughout the first liquid container.

16. The system of Claim 12, further comprising:

a second liquid container configured to receive treated liquid from the first liquid container after the liquid has passed through the filter device; and

a second contaminant indicator element within the second liquid container, the element containing at least one agent capable of undergoing a color-change reaction in response to at least one contaminant.

17. The system of Claim 16 wherein the second contaminant indicator element is attached to a wall of the second liquid container in a position in which the contaminant indicator element can come into contact with the treated liquid.

18. The system of Claim 16 wherein the second contaminant indicator element is attached to the filter device.

19. The system of Claim 16 wherein the second contaminant indicator element is able to move freely throughout the second liquid container.

20. A filtering device for a gravity-flow liquid treatment system, comprising a first filter component capable of providing a visual indication of exposure to at least one contaminant.

21. The device of Claim 20, further comprising:

a housing in proximity to the first filter component; and

a substantially transparent region in at least a portion of the housing and configured to provide a view of the visual indication of exposure.

22. The device of Claim 21 wherein the substantially transparent region comprises a material selected from the group consisting of silica glass, fused quartz, polycarbonate, polystyrene, NAS® (styrene methacrylate copolymer), SAN (styrene-acrylonitrile copolymer), PET (polyethylene terephthalate), and PET-G (polyethylene terephthalateglycolate), and copolymers thereof.

23. The device of Claim 20 wherein the filter device is configured to purify water.

24. The device of Claim 20 wherein the filter device is configured to provide a sufficient liquid flow rate through the filter device with a liquid head pressure of less than about 1.0 psi .

25. The device of Claim 20 wherein the filter device is configured to provide a sufficient liquid flow rate through the filter device with a liquid head pressure of less than about 0.5 psi .

26. The device of Claim 20 wherein the contaminant comprises particles.

27. The device of Claim 20 further comprising a second filter component within the housing, in proximity to the first filter component, the second filter component containing a purification agent.

28. The device of Claim 27 wherein the purification agent adjacent to the first filter component cannot pass through the first filter component.

29. The device of Claim 27 wherein the purification agent comprises carbon.

30. The device of Claim 27, further comprising an intervening porous layer between the first filter component and the second filter component.

31. The device of Claim 30 wherein the intervening porous layer comprises a material selected from the group consisting of cotton, rayon, nylon, wood pulp, polymers, and fiberglass.

32. The device of Claim 30 wherein intervening porous layer comprises fine mesh hydrophilic beads

33. The device of Claim 20 wherein the first filter component comprises a hydrophilic porous material.

34. The device of Claim 33 wherein the hydrophilic porous material has a water pass rate greater than about 1 $\mu\text{m}/\text{sec}$ at a pressure of approximately 1 atm.

35. The device of Claim 33 wherein the hydrophilic porous material is selected from the group consisting of polyester, nylon, rayon, wood pulp, hydrophilized polypropylene, hydrophilized polyethylene, hydrophilized PBT (polybutylene terephthalate), hydrophilized Teflon™, thermoplastic fibers, abaca, cellulosic fibers, and combinations thereof.

36. The device of Claim 35 wherein the hydrophilic porous material comprises a porous polyester-polyethylene bi-component material.

37. The device of Claim 20 wherein the first filter component comprises a material capable of attracting contaminants.

38. The device of Claim 20, further comprising a first agent associated with the first filter component, the first agent capable of undergoing a color-change reaction in response to at least one contaminant.

39. The device of Claim 20, wherein the first agent is dispersed on at least a portion of the first filter component.

40. The device of Claim 38 wherein the first agent changes color when aqueous contact with an inorganic contaminant is made.

41. The device of Claim 38 wherein the first agent changes color when aqueous contact with an organic contaminant is made.

42. The device of Claim 38 wherein the first agent changes color when aqueous contact with a bacteria is made.

43. The device of Claim 38 wherein the first agent changes color when aqueous contact with a virus is made.

44. The device of Claim 38 wherein at least a portion of the first agent is coated with a water-soluble cover material having a first thickness.

45. The device of Claim 44 wherein a portion of the first agent is coated with a water-soluble cover material having a second thickness greater than the first thickness.

46. The device of Claim 44 wherein at least a substantial portion of the first agent is coated with a water-soluble cover material, the material having a thickness that increases progressively from a first region of the first filter component to a second region of the first filter component.

47. The device of Claim 44 wherein the water-soluble material is selected from the group consisting of films of starch, polyvinyl alcohol, and water-soluble GRAS materials.

48. A water purifying system, comprising:
a filter device configured to receive water from a source; and
a first agent in the filter device, the first agent capable of providing a user with a visual indication of exposure to at least one contaminant, wherein the visual indication is achieved through a color-change reaction to the contaminant.

49. The system of Claim 48 wherein the water purifying system is a gravity-driven system.

50. The system of Claim 48 wherein the water purifying system is a pressure-driven system.

51. The system of Claim 50 wherein the water purifying system is configured for use on a water faucet.

52. The system of Claim 50 wherein the water purifying system is an under-the-counter system.

53. The system of Claim 50 wherein the water purifying system is a pressurized countertop system.

54. A filtering device for a water purifying system, comprising a first agent associated with a first filter component, the first agent capable of providing a visual indication of exposure to at least one contaminant, wherein the visual indication is achieved through a color-change reaction to the contaminant.

55. The device of Claim 54 wherein the first agent is dispersed on the first filter component.

56. The device of Claim 54 further comprising;
a housing in proximity to the first agent; and
a substantially transparent region in at least a portion of the housing, the substantially transparent region configured to provide a view of the visual indication of exposure.

57. The device of Claim 54 wherein the color-change reaction occurs when the first filter component makes aqueous contact with an inorganic contaminant.

58. The device of Claim 54 wherein the color-change reaction occurs when the first filter component makes aqueous contact with an organic contaminant.

59. The device of Claim 54 wherein the color-change reaction occurs when the first filter component makes aqueous contact with a bacteria.

60. The device of Claim 54 wherein the color-change reaction occurs when the first filter component makes aqueous contact with a virus.

61. A method of determining substantial target contaminant removal in a gravity-flow liquid treatment system, comprising:

- providing a gravity-flow liquid treatment system, which includes a source liquid container, a treated liquid container, and a filter device, through which device a source liquid can flow from the source liquid container to the treated liquid container, thereby producing a treated liquid;

- providing a first indicator element within the source liquid container, the first indicator element capable of undergoing a color-change reaction when exposed to a first target contaminant;

- providing a second indicator element within the treated liquid container, the second indicator element capable of undergoing a color-change reaction when exposed to the first target contaminant;

- introducing the source liquid into the source container;

- observing whether the first indicator element undergoes a first color change after the first indicator element has had substantial contact with the source liquid;

- allowing the source liquid to flow through the filter device and into the treated liquid container;

- observing whether the second indicator element undergoes a second color change after the second indicator element has had substantial contact with the treated liquid; and

- comparing the first color change to the second color change and applying specific criteria to determine whether substantial removal of the first target contaminant from the source water has occurred.

62. The method of Claim 61 wherein applying specific criteria comprises:

- observing a considerable first color change on the first indicator element;

observing no considerable second color change on the second indicator element; and

concluding that the filter device has substantially removed the target contaminant from the source water.

63. The method of Claim 61 wherein applying specific criteria comprises:

observing a considerable first color change on the first indicator element;

observing a considerable second color change on the second indicator element; and

concluding that the filter device has not significantly removed the target contaminant from the source water.

64. The method of Claim 61 wherein applying specific criteria comprises:

observing no considerable first color change on the first indicator element;

and

concluding that the target contaminant is not substantially present in the source water.